ENERGY SECURITY FOR CANADA

IMPROVING ENERGY EFFICIENCY

Ontario
Ministry of Energy
Honourable Vincent G. Kerrio
Minister

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A MESSAGE FROM
THE HONOURABLE VINCENT G. KERRIO
ONTARIO MINISTER OF ENERGY

The Ministry of Energy has prepared this discussion paper on the theme of energy security for Canada specifically for the federal/provincial energy ministers' meeting in Ottawa on January 30, 1987. It is intended to provide a basis for discussion at the conference, and to serve as a source of information on current energy issues in Canada.

Because energy is so important to our province, the Government and people of Ontario are committed to playing a constructive leadership role in energy matters in Canada.

Our goal is to co-operate with other provinces and the federal government, as well as private interests - to work toward solutions that will benefit all Canadians, by ensuring a more secure and efficient energy future.

Vincent G. Kerrio

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Minister of Energy

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IMPROVING ENERGY EFFICIENCY

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1. INTRODUCTION

This paper deals with Canada's approach to securing the future through the efficient use of energy. It examines the way we use energy to meet our needs, and proposes a framework for ensuring that the potential energy savings and economic benefits of improved efficiency are fully realized.

2. THE IMPORTANCE OF ENERGY EFFICIENCY

Canada has always been a heavy consumer of energy. It also possesses vast quantities of energy resources.

In the early 1970s serious problems emerged in international energy markets, affecting both the availability and price of supplies.

Improved energy efficiency has contributed enormously to easing these problems. In particular, a large reduction in oil demand was the main factor that made the massive oil price increases unsustainable.

Energy efficiency must have the highest priority among policies to strengthen Canada's energy security. As the costs of new energy supplies rise, it becomes increasingly more economical to invest in efficient energy use than in new supply development.

Despite recent improvements, Canada remains one of the heaviest energy-using nations in the world. Its trading partners and competitors use less energy to produce the same level of economic output, and they have outstripped Canada in efficiency performance since 1973. There remains a great potential for further improvement in Canada.

More efficient energy use is important to Canada for several reasons.

- It makes industry more competitive.
- It extends the life of energy supplies.
- It provides flexibility in energy supply planning.
- It saves consumers money and frees up spending power to stimulate the economy.
- It creates jobs throughout the community.
- It contributes to a cleaner environment.

Improving the productivity of energy use offers an excellent opportunity for strengthening Canada's future — for industry, for commerce, for personal quality of life.

An active and diversified energy demand strategy must therefore be a national priority.

3. CANADA'S ENERGY EFFICIENCY

Achievements To Date

Canada has made notable improvements in energy efficiency since the early 1970s.

The amount of energy used in Canada for each unit of economic output fell by 16 per cent between 1973 and 1984. Efficiency improved in every sector of the economy, though not uniformly.

- There were large improvements in household energy use and car fuel consumption.
- Commercial buildings took advantage of more efficient space heating, lighting and equipment.
- Many industrial companies cut their energy use in relation to their output of goods, but the improvement in industry as a whole was not as great as in other sectors of the economy.

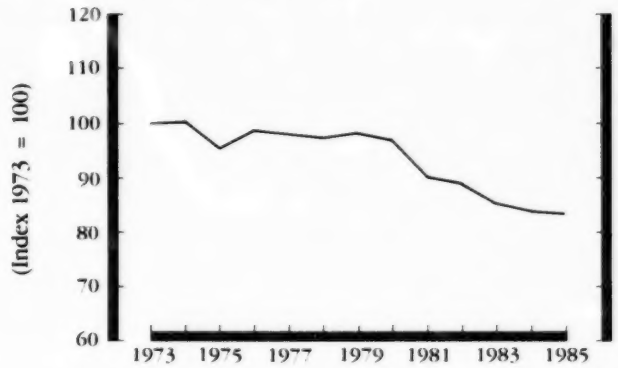
Improvements in Energy Efficiency, 1973-84

Sector	Measure of Energy Use	Efficiency Improvement
Household	per household	22%
Transportation*	per car	20%
	per truck	6%
Commercial	per $ commercial output	19%
Industrial (excluding petrochemicals)	per $ industrial output	8%
Total End-Use	per $ Real Domestic Product	16%

* 1980 to 1984
Source: National Energy Board

Canada's Energy Intensity Trend

(Energy Use/Real GDP Ratio)

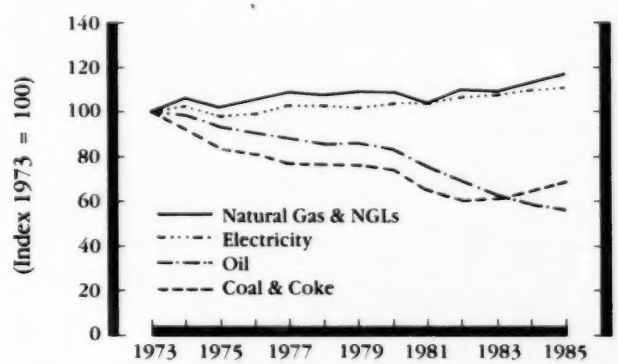


Source: National Energy Board

The picture for individual fuels shows that the intensity of oil use fell dramatically. Oil use per dollar of economic output is now only half what it was in 1970. The intensity of natural gas and electricity use rose, but much of this increase was due to expanded markets and substitution for oil. Improved efficiency kept the overall intensity of natural gas and electricity use to moderate increases over this period.

Fuel Intensities in Canada

(Energy Use/Real GDP Ratio)



Source: National Energy Board

The gains in energy efficiency have largely occurred since 1980. In just five years, Canada's total energy use per unit of output fell by one-seventh. The result is that total energy consumption in 1985 was still below its 1980 peak, even though the economy was 11 per cent larger.

Government policies contributed to improved energy efficiency.

In many areas of the economy, government policies and programs were an important factor in achieving more efficient energy use.

- Over 2 million homes were insulated under the Canada Home Insulation Program.

- Appliance efficiency improvements that were spurred in part by energy labelling requirements are estimated to have saved consumers $140 million in five years.

- Automobile fuel efficiency improved by over 40 per cent for new cars, in part due to the fuel economy standards mandated in the United States.

- Governments achieved significant energy savings in their own buildings and vehicles.

- Joint government programs were instrumental in the development, testing and demonstration of many new energy-conserving technologies.

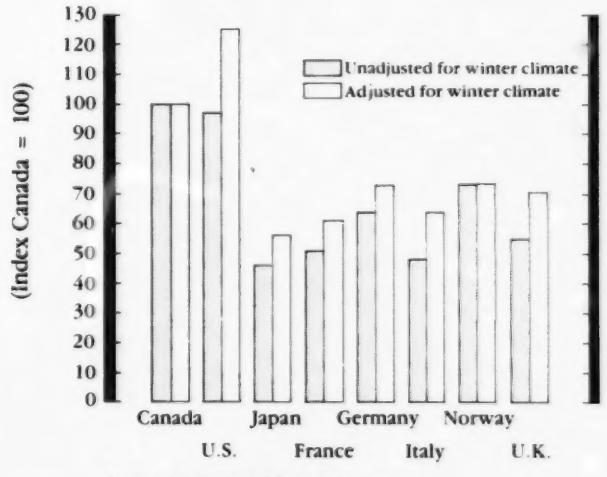
International Comparison

Despite recent gains, Canada still lags behind other countries in energy efficiency.

Canada's energy use per unit of economic output is almost twice as high as that of Japan and major European countries; only the United States is comparable. Some of this difference can be attributed to climate. However, adjusted for winter climate, Canada's energy intensity is still 35 per cent or more above that in Europe or Japan. Some of the difference is also attributed to the mix of energy-intensive industries. Canada has many resource-upgrading industries which require large amounts of energy, including the pulp and paper and primary metals industries. However, the

Levels of Energy Intensity in Industrial Nations

(Energy Use/Real GDP Ratio, 1984)



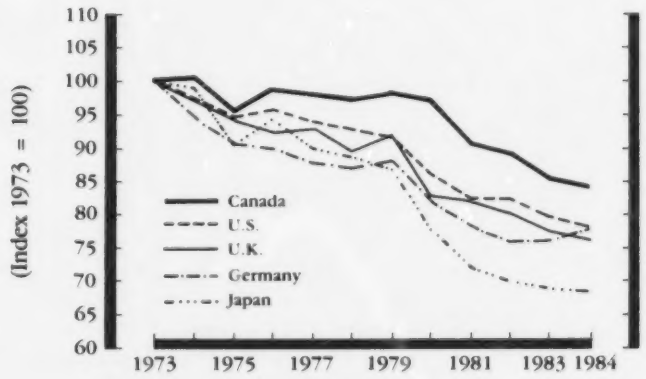
Source: International Energy Agency

differences cannot be traced solely to the mix of industries. Canada's transportation and residential/commercial energy intensity is significantly higher than that in several other countries.

Furthermore, Canada's competitors in world markets have outperformed us since 1973 in reducing the amount of energy consumed per unit of output. Especially disturbing is Canada's relatively low level of improvement in industrial energy efficiency. In residential/commercial use, Canada showed a rate of improvement as good as most of its competitors, and in transportation use it has done better. However, Canada started from much higher levels of energy intensity and has failed to close the gap in relative terms.

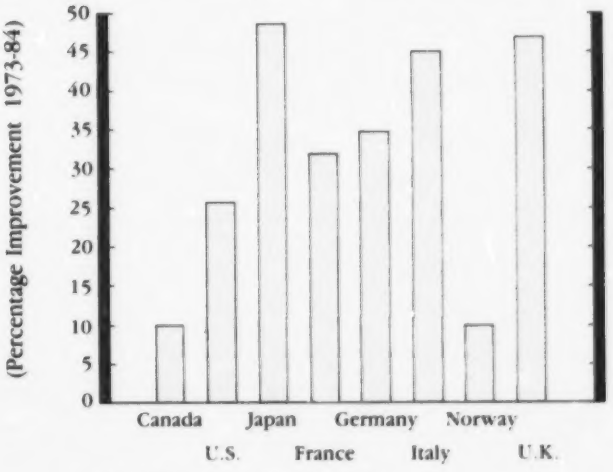
Trends in Energy Intensity in Industrial Nations

(Energy Use/Real GDP Ratio)



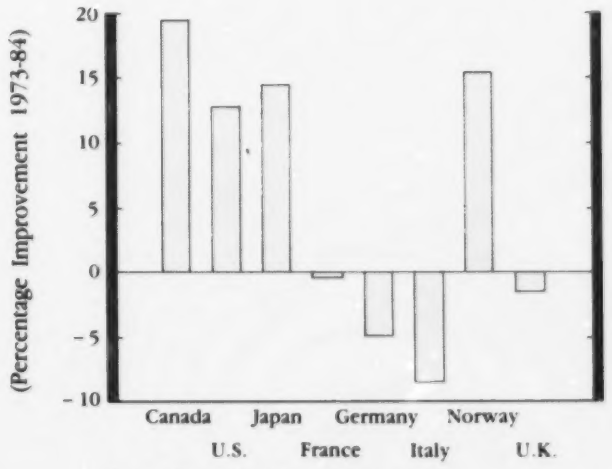
Source: International Energy Agency

Improvements in Industrial Energy Efficiency



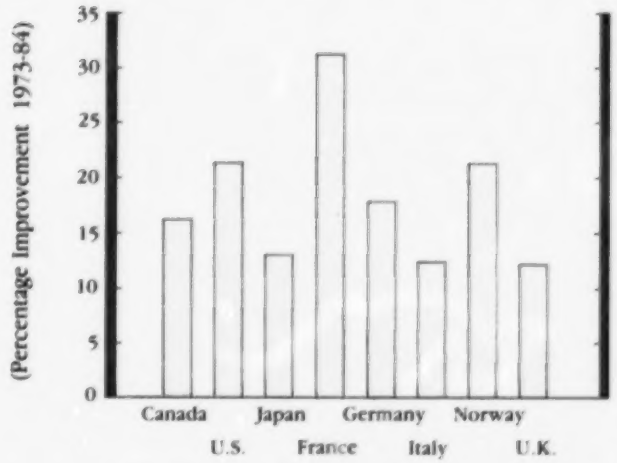
Source: International Energy Agency

Improvements in Transportation Energy Efficiency



Source: International Energy Agency

Improvements in Residential/Commercial Energy Efficiency



Source: International Energy Agency

Commitment to energy conservation and therefore improved productivity of energy use is a key component of global competitiveness. Japan, Germany and the U.K., for example, have outperformed Canada in improving energy productivity, and have made greater adjustments to the energy environment of the last 15 years. Canada's future competitiveness will be strengthened with a national commitment to improving energy efficiency.

Outlook and Potential

Forecasts of Canada's energy requirements are based on the belief that energy efficiency will continue to improve.

The recent National Energy Board staff report, "Canadian Energy Supply and Demand, 1985-2005", predicts that Canada's overall energy intensity will be 12 to 15 per cent below 1985 levels by the end of the century, depending on the outlook for energy prices. This largely reflects the expectation that people will continue to adopt more fuel-efficient cars, houses, appliances, industrial equipment and buildings as they invest in new capital stock. It also reflects the belief that concern and awareness for energy conservation will not disappear, particularly while memories of past price increases remain strong.

However, Canada cannot afford to be complacent about the way it uses energy.

With the forecast growth in Canada's economy, the nation's energy needs will be significantly higher by the year 2000. Moderate economic growth of 2 to 3 per cent a year could lead to energy requirements some 20 to 30 per cent a year higher in that time, despite the projected efficiency improvements.

In particular, rising oil demand combined with slow development of new supplies could greatly increase Canada's dependence on imported oil. Growing electricity demand will put pressure on provincial electrical utilities. Even

Canada's large existing natural gas supply could be insufficient for domestic needs by the end of the century. The concern is that the current environment of oversupply may weaken the sense of urgency about energy conservation.

Energy efficiency and conservation improvements can therefore contribute to Canada's long-term economic strength, by extending the horizons before new energy supplies are needed.

Canada would need to increase its current energy efficiency by 35 per cent or more to be at levels found in western European countries. Closing this gap by one half would save the energy equivalent of at least 200 million barrels of oil annually. This kind of achievement in the use of energy would extend the horizons before new supplies become necessary.

The potential for energy efficiency improvements is much greater than that embodied in present forecasts.

Several key areas possess considerable scope for greater efficiency improvements. Many old buildings, most existing lighting and motors, and many industrial processes have not yet been upgraded to improve their energy efficiency. New building stock, new vehicles, and revamped manufacturing processes are not yet adopting many available technologies that lead to major energy savings, although the technologies have already been developed and brought to market.

Examples of New Energy-Saving Technologies

Housing:
- R-2000 house designs
- High-efficiency condensing furnaces and boilers
- Air-to-air heat exchangers
- Double-glazed windows
- Improved heat pumps
- High-efficiency refrigerators and freezers
- Setback thermostats

Commercial Buildings:
- Low-energy building designs
- Heat recovery systems
- Thermal storage
- High-efficiency boilers and furnaces
- Computerized energy management systems
- Efficient lighting systems
- Timer controls for lighting and equipment

Industrial Applications:
- Improved process monitoring
- Microcomputer process controls
- Waste heat reclaim systems
- High-efficiency electrical motors
- Efficient electro-technologies
  - e.g. radiant heating, infra-red drying, microwave heating
- Process specific:
  - Thermo-mechanical pulping
  - Improved combustion recuperative and regenerative burners
  - Membrane separation for food processing and waste treatment

Transportation:
- Vehicle-specific:
  - Microprocessor engine control
  - Fuel injection
  - Lightweight automobile body components
  - Fuel-efficient aircraft jet engines
- Computerized traffic control systems

- o Fewer than 25 per cent of new gas furnaces sold today are classified as high-efficiency (over 90 per cent seasonal efficiency).

- o New commercial buildings can be built that use less than one-quarter the energy of the average existing building, but market penetration is low.

- o The R-2000 standard for homes offers energy savings of up to 70 per cent, but less than one per cent of new housing starts meet this standard.

Today, many energy conservation and efficiency investments are cost-effective, and have been proved to save money, increase comfort, and raise productivity. Energy consumers — whether residential customers, vehicle users, farmers, businesses, or industries — can now choose from a wide variety of energy-saving techniques. The barriers are often those of information, confidence in technical performance, and perceived financial risk. Governments can help to overcome these barriers by increasing the awareness of these technologies in our society and improving the transfer of technology to commerce and industry.

4. FRAMEWORK FOR AN ENERGY-EFFICIENT CANADA

In light of the benefits of increased energy efficiency to Canada's economy, and the potential for greater improvements than are forecast without government action, there is an important role for both federal and provincial governments.

Principles

Governments should make a commitment to an active program to promote energy efficiency and conservation.

Government leadership is essential in keeping the goal of energy efficiency high in the public's awareness. Consumers and businesses look to government for reliable information on new energy-saving technologies — especially their benefits, costs, safety and reliability — to reduce perceived risk and to increase confidence in technical performance. Government leadership in demonstrating cost-effective investments in energy efficiency must also be emphasized. Meeting the economic and social objective of efficient energy use requires changes in all sectors of energy use, major investments throughout the economy, and an active campaign to promote energy conservation and efficiency improvements in our society.

Energy efficiency should be emphasized when new investments are being made in long-lasting capital stock.

Many of the things that use energy — homes, commercial buildings, appliances, vehicles, industrial equipment and processes — last for many years. Investment in energy-efficient equipment from the start will build permanent improvements into the economy.

Governments should look beyond any short term forecasts of energy prices.

World oil prices are likely to remain volatile, and adjusting to price movements, both up and down, is difficult. In the long term, it is likely that prices will rise again. Canada needs to make wise investments that will withstand any future price jolts, and energy efficiency must be a prime criterion. Economically viable energy investments today will strengthen the future positions of the individuals and businesses that make them.

Reduced dependence on oil should continue to be a national priority.

In the short term, the recent drop in oil prices could make increased oil use more attractive. But future oil price rises are quite likely, and Canada's dependence on imports of light crude oil is expected to increase. Structural changes that result in increased oil dependence may not be in consumers' long-term interests.

Areas for Specific Action

The federal government should maintain a high level of financial support for research and development of new energy-efficient technologies.

Many of the recent innovations in energy-efficient technology have resulted from research and development work undertaken with government assistance. The federal government in concert with provincial governments should continue to make substantial funding available to researchers, equipment manufacturers and suppliers, and energy users to develop new ways of saving energy.

The federal government should mandate efficiency standards for the sale of major energy-using appliances.

There are significant parts of the energy marketplace in which standards and guidelines are the most appropriate approach to obtaining a more energy-efficient capital stock.

Standards should apply to refrigerators, freezers, air-conditioners, washers, dryers, dishwashers, heat pumps, water heaters, and furnaces. Although there will be costs incurred in imposing minimum standards, the value of the potential energy savings could be substantially greater. Valuable reductions in electricity generation requirements can be achieved by such a national program. The option of a voluntary manufacturers' program of compliance should be examined, but if one cannot be satisfactorily implemented, then mandatory standards should be imposed.

The National Building Code's energy efficiency standards should be updated.

At present, the Code contains reference only to levels of energy efficiency appropriate to the late 1970s. Since major advances in energy-efficient building construction have occurred in recent years, the Code's energy standards should be updated to reflect current technologies and practices.

Tax incentives for investments in energy efficiency should be maintained.

The fast write-off for energy-efficient equipment provided in Class 34 of the Income Tax Act has helped stimulate investment in more energy-efficient buildings and equipment. Tax reform should not diminish this incentive.

Ontario's Commitment

Ontario is prepared to continue its role as a significant player in developing a national strategy on energy efficiency.

- It will facilitate the adoption of national energy-efficiency standards within its jurisdiction (e.g. appliance standards).

- It will demonstrate leadership in conservation by setting and achieving targets in its own operations (i.e. government buildings and vehicles).

- It will continue to match federal initiatives in the funding of research, development and demonstration of new energy-efficient technologies, under the Canada-Ontario Memorandum of Understanding.

This commitment demonstrates Ontario's desire to contribute to Canada's objective of increasing its energy security while enhancing the competitive position of its economy.